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Edited by Professor **RAMA DEVA.**

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THE

Vedic Magazine

सर्वेषामेव दानानां ब्रह्मदानं विशिष्यते । (मनु०)

"Of all gifts that of Divine knowledge is the highest and the noblest." *Manu.*

VOL. IV. | MARGSHIRS 1967. | No. 6.

Dayananda, a Prophet of Peace.

The death anniversary of Bhagwan Dyananda fell on the Dewali day last month and was celebrated throughout the country. It is, therefore, but appropriate that the place of honor in this issue should be given to an article giving an admirable character sketch of the greatest vedicist of modern times. Editor V. M.

In season and out of season, it has been dinned into our ears that Swami Dayananda was a reformer of an agressive type and that he was the founder and organiser of a movement calculated to sow the seeds of discontent and to rouse feelings of enemity between members of different communities and followers of different faiths. The ashes of the dead Sannyasin have been raked up, his methods of propagandism have been subjected to a cross-fire of baseless criticism, his ways of interpreting the Shastras have been made the target of contumelious condemnation and his tenets and doctrines have been held

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up to unmerited redicule. Even his ardent devotees and sincere admirers, they say, imbibed his aggressive spirit and are dubbed as malcontents and stigmatised as visionaries. Nine and twenty long years have rolled by since Swami Dayananda shook off his mortal coil but still a fierce light beats about the personality of that great man and time has not deadened the sense of loss occasioned by the sad termination of the life's journey of that great reformer. Love, sympathy and gentleness are the salient features in the character of our nation and while we have a tender regard for the feelings of the living, we have a still greater regard for the feelings of the dead. Do not our Shradhas and other obsequal ceremonies bear ample testimony to the fact that our veneration for the dead is sometimes carried to a superstitious extent ?Our reverence for the dead is simply unbounded and our solicitude for the well-being of the departed is singularly unparalleled. But by a sad irony of fate, in the case of Rishi Dayananda we seriously doubt whether we have been faithful to our traditions.

Dayanand's sturdy optimism, his untiring zeal, his unconquerable will and his laborious search after truth have been only equalled by his inflexible integrity, his indomitable courage and a rare simplicity of character. His sole end and aim in life had been to revive the Vedic Religion and to achieve that end, he sacrificed all his worldly prospects. To endeavour to solves the problem of life and death he underwent all sorts of miseries and privations and in his glorious attempts to establish the kingdom of righteousness on earth, he fell a victim to the treachery of imaginative gossipers and calumniators. He *never* sat at the feet of a Mazzini or a Garibaldi but drew his inspiration from *Kapila* and *Kanada*. It was not a revolutionary that infused spirit in him but it was a Sannyasi a hermit, an ascetic, a Yogee—Swami Virajanand—that

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fired him with enthusiasm to hoist the flag of OM. once more in "the land of the Vedas" After name and fame he hankered not, for pelf and power he cared not. A *Paramahansa* who preemptorily refused to accept the *Mahantaship*, could never think of 'gaining empires and founding Kingdoms'. An asectic who blessed those that cursed him could *never* harbour feelings of enemity towards "foriegners." A profound Vedic scholar whose whole life-time was occupied in writing out voluminous commentaries of the Vedas could *never degrade* himself by incorporating *"objectionable matter"* in them. How could a reformer who sincerely believed that the Vedas were revealed by God in the beginning of creation for the benefit of the whole human race, ever raise the cry "India for Aryans" ? He was the founder and organiser of an *international* movement." Cosmopolitanism is the badge of that movement. His mission instead of being highly aggressive, as is generally supposed, is a mission of *peace*, *philanthropy*, *bliss* and *beatitude* and in support of this contention of ours we cite certain instances.

I. Swami Dayananda has written many books. The Sattayarth Prakash is his *magnum opus*. It is this book that has brought about a mighty revolution in the religious thought of modern India and it is therefore that the jealousy of some bigots and fanatics has been roused. The stentorian voice of the Indian Luther and his call to duty was too powerful for those that were adversely affected by it to keep quite. The enemies of the movement being blinded by prejudice quote certain passages from the book at random and endeavour to brand the book as *"Seditious"*. When the Patiala Seditions (?) Case was being tried, men 'behind the scenes' began to fulminate to their hearts' content and many of the leading Newspapers in India reproduced these fulminations only to raise a "storm in the tea-cup. The Arya Samaj being backed up by no

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power other than that of righteousness could not question the right of such men to employ all the superlatives that suggested themselves to them in crying down the movement. They limned a picture of the present condition of the Arya Samaj which existed only in their heated imagination but thank God, truth ultimately triumphed. Such as were carried away by these fulminations and denunciations are earnestly requested to brood over the following passages. In his introduction to the Sattyartha Prakash, Swami Dayanand says.

" My chief aim in writing this book is to unfold truth which consists in expounding truth as truth and error as error. The exposition of truth in place of error and of error in place of truth does not constitute the unfolding of truth. To speak of, write about and believe in a thing as it is constitutes truth. "

To those who consider the Arya Samaj a national movement and its founder a national leader, the following lines will give ample food for reflection. " Though I was born " says Swami Dayanand " in Aryavarta and still live in it, yet just as I do not defend the evil doctrines and practices of the religions prevailing in the country, on the other hand expose them properly, in like manner I deal with alien religions. *I treat the foreigners in the same way as my own countryman* as far as the elevation of the human race is concerned. Had I taken to the advocacy of one of the prevailing religious of India, I would have done the same as the sectaries of the present day do, viz, praise, defend, and preach their own religion and decry, refute and check the progress of that of others."....

" There are undoubtedly many learned men among the followers of every religion, should they free themselves from prejudice and accept universal truths—those truths that are to be found alike in all religions and are of uni-

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versal application—and reject all things in which they differ and *treat each other lovingly*, it will be of great benefit to the world."

Prophets of aggression will please ponder over the lines printed in italics. Will they ever be prepared to reconsider their judgment.?

II. The opening lines of Sattyarth Prakash are "ओ३म् शन्नो मित्रः शं वरुण शन्नो भवत्वर्यमा" &c.

"Oh God, Thou art the *friend* of all, controller of the universe, be *merciful* unto us." All the ceremonies performed by the followers of the Vedic religion are concluded by what is known as "Shantipath." At the end they always repeat "OM, Shanti; Shanti: Shanti:,"

"Peace, Peace and Peace to all Sentient beings."

III. Every Arya is enjoined to perform five Yajnas and of these the Bhoota-yajnas and Atithi-yajna necessarily have for their basis the principles of *Philanthrophy*." All these convey the message of peace and happiness to all beings.

IV. The Seventh Principle of the Arya Samaj says "सब से प्रीति पूर्वक धर्मानुसार यथायोग्य वर्तना चाहिये" "*Love to all*" ought to be the Aryan motto.

V. Swami Dayanand maintains that animals are not to be sacrificed and rightly holds that such sacrifices are not sanctioned by the Vedes. He was the prince of humanitarians and a strong advocate of Vegetarian diet. "मित्रस्य चक्षुषा सर्वाणि भूतानि समिक्षन्ताम्" was his favourite motto. सहनावतु सहनौ भुनक्तु सहवीर्यं करवा । तेजस्विनौ अधितमस्तु मा विद्विषा महै ॥ was his Maxium? What an embodiment of love was he!

It seems as if he was a second *Budha*.

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VI. The way in which he disposed of what little he had, the establishment of the Paropkarini Sabha, the arragements made to print books and issue them at a cheap price, all these show with what friendly feelings he was actuated towards his countrymen.

VII. Again, the 6th principle of the Arya Samaj also lays down. "संसार का उपकार करना इस समाज का मुख्य उद्देश हैं"-Could the man who preached this, ever dream of establishing a "*National movement*" ?

These are some of the reasons which have led us to believe that Swami Dayananda was a Prophet of *Peace*" Of course, he has given some hard hits here and there but even there he is full of love and sympathy.

In spite of Swami Dayanand having been a great scholar, he admitted that the Rishis of yore were greater than himself and that his exposition and interpretations of the Vedas should be studied in the light of old commentators. In none of the ten principles of the Samaj does he declare that his interpretation of the Vedas must be accepted by all and that his views regarding other philosophic topics are true and nothing but true.. Have other commentators and founders of different sects held the same views ? They have forced upon others what they thought to be correct and their disciples have to accept their views, without the least compunction, as wholly correct. Can there be greater moderation than this?

Just before the advent of Swami Dayananda and even after it, the condition of Aryavarta was really deplorable. The Hindus were a nation sunk in ignorance and superstition worshipping stocks and stones and not being satisfied with the 33 crores of gods offerred sacrifices at the altars of other gods the products of the brains of other sects wholly foreign. At

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such a juncture, to proclaim the worship of one unincarnate God does not seem to us at least *aggressive*. We were and are priest-ridden and many Sadhus, crafty that they were, duped us. Under the protection of religion and morality, a class of beggars had come into existence. Numerous sects hopelessly divided in their opinions were quarrelling on the way in which caste-marks were to be put on the idols whether in the horizontal or perpendicular direction.

Dayananda saw with "unerring instinct" that his fellow-beings were looked upon as "enemies" and love for humanity, *arash* language and lore had gone and respect for Dharma was slowly sinking. He therefore organised the Samaj to revive the study of the Vedas and Sanskrit. Was this aggression? In times of famine many orphans just to keep the body and soul together, embraced other religions and our ranks were thinned by constant conversions. Hence he set on foot the "*Shuddhi movement.*" His followers have established orphanges. To revive the much neglected female education, they have opened Kanya Pathshalas; to revive the system of Brahmacharya they have opened Gurukulas, to make the study of Vedas popular and to furnish means of education on western lines, they have established colleges and schools. *Is this all due to an aggressive spirit?*

To eradicate some social evils which are eating into the vitals of our society, some stringent rules must be framed. The strength of the medicine must be proportionate to the strength of the disease. Hatred of evil is not sin. We cannot love the good unless we discard evil. Unbiassed reader! Would you call a doctor "aggressive' who prescribes a bitter medicine for a chronic disease? Is a surgeon wanting in toleration who ampulates a diseased leg? Is a wise mother destitute of love if she takes measures to correct her misguided son? Is a teacher, a Horod, if he were to bring to book an

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immoral pupil of his? Is a judge wanting in kindness if he condemn a criminal? Is, then, Swami Dayananda an aggressor? As for ourselves we firmly believe that Swami Dayanand was a *Prophet of Peace* more than anything else.

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Radium and Radio-Activity.

II.

In our present article we propose to give a short account of the changes which the typical radio-element radium—along with its parents and descendents—is under going at all-times, quite independently of the forces under human control. But before doing it so would be well to devote some space to the consideration of the hypothesis which tries to explain these unique transformations.

THE THEORY OF ATOMIC DISINTEGRATION.

We have seen that radium possesses, for all practical purposes, an inexhaustible store of energy. Two main hypotheses have been set forth to explain this source of energy in radium. One of these regards radium as a dyname which takes up energy from outside and converts it into Becqeral rays. The second hypothesis regards radium as an extremely unstable element, which is undergoing spontaneous decomposition, giving forth in the process a great outburst of energy. At present, the second view is the one generally accepted.

It was seen that radio-activity is an atomic property, and consequently must result from a process occuring in the atom and not in the molecule. Thus the degree of activity of any salt is directly proportional to the amount of radio-active element in it, having no connection with its acid part. The activity of the different radium salts, *e. g.* radium bromide, radium nitrate, differs from that of each other and depends purely in each case, upon the percentage of radium in each gram of the salt. There is another fact which supports the above view. It seems that radio-active change is independent of temprature, thus proving the difference of this change from ordinary molecular changes.

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In order to explain the results observed, Rutherford and Soddy advanced their "Disintegration Theory." According to it the atoms of radio-active substances are unstable and a certain fixed proportion of these becomes unstable every instant and breaks forth, accompanied generally by an *alpha* or *beta* particle or both, and in this decomposition lies the source of energy associated with these elements. The residue of an atom owing to the loss of the *alpha* particle is lighter than before and becomes the atom of a new substance quite distinct from its parent. These new substances produced have a limited life and in their turn disintegrate into other new products and so on, until we finally get a stable body or to be more accurate, one whose activity we fail to detect. Professor Soddy thus describes the disruption of the individual atom :—

"The disruption of the individual atom is a sudden and explosive process, but differs from that of ordinary explosion in the fact that the explosion of an atom exerts no influence on the rate of explosion of its neighbours. In an explosive substance as, for example, fulminate of mercury or acetylene the disturbance occasioned by the disintegration of a single molecule is the *cause of the explosion* of the surrounding molecules, so that the whole mass detonates in a very short interval of time. In the case of the disintegrating atoms the cause of the disintegration is at present unknown. It proceeds at a definite rate, a fixed proportion of the total atoms disintegrating in the unit of time, without hindrance or acceleration by any agency known. Radio-activity and the processes which give rise to it appear to lie totally outside the sphere of known molecular forces. No change in the chemical and physical properties of the atom appears to occur as it approaches the termination of its existence as a seperate entity. Suddenly, and without previous indication, it flies to pieces by some internal cataclysm, the cause of which we can only conjecture. The vast store of energy bound

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up with its internal structure, and which make it a stable system to all the relatively insignificant forms of energy manifested in an ordinary chemical or physical change, are revealed when the structure flies to pieces. The internal energy of the chemical atom becomes for the first time knowable when it disintegrates. Because the atom has never in any other process been observed to change, and because it does change in exhibiting radio activity, we have the explanation of the fact that the energy associated with matter in the rays of the radio-elements is of a higher order of magnitude than has ever been dealt with in science before. Radio-activity thus draws its supply of energy from a previously untapped reservoir—the latent energy associated with the atomic structure.

How easy it is to explain the persistent emission of energy by the aid of this theory, which is also in accordance with the principle of the conservation of energy. The atom, again, is supposed to consist of a number of still smaller particles in rapid oscillatory or orbital motion and consequently contain a great store of energy. Part of this energy is realised in radio-active changes when the atom of one substance disintegrates into a lower system with the expulsion of one of these charged particles.

RADIO-ACTIVE CHANGES.

Now we shall proceed to examine the changes that are constantly going on in our typical element radium.

Radium Emanation: its Discovery.

If an air current be passed over a radio-active element or bubbled through its solution, it acquires the remarkable property of discharging a charged electroscope thus resembling the radio-active element itself. What is still more remarkable is the fact that the air retains this property although it be filtered through wool,

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bubbled through water or passed through a strong electric field. From this it is clear, that the air has not become ionised by contact with the radio-element, for had it been so all the ions it contained would have been arrested by cotton wool. The only other alternative explanation of the phenomenon is in the assumption that the air in its passage through radio-active solution has taken up some thing capable of ionising gases, but consisting of no solid particles. The nature of this substance, which was named by Rutherford emanation, remained for a time quite unintelligible, until it was finally demonstrated to be a gas.

Properties of the Emanation.

If we take a small quantity of radium bromide and heat it in a tube, a radio-active gas. *i. e.* radium emanation will be evolved. It resembles radium in many of its properties, for instance it emits Bacqueral rays, ionises gases, affects photographic plates and lights up a fluorescent screen brought near it. Owing to to the scanty supply of radium at our disposal, the quantity of the gas obtained is no doubt extremely small. Fifty millegrams of radium bromide costing several hundred pounds will evolve emanation at any one time, whose volume with not exceed that of a pin's head. But the gas is so active that it is able to retain its characteristic property of ionising even when mixed with a million times its own volume of air. As we have said above, the emanation can also be obtained by dissolving the radium salt in water.

The emanation possesses all the characteristic properties of gases. It diffuses through gases, liquids and porous substances, and can be occluded in some solids. It obey's Boyle's, Guy Lussac's and other gas laws, just as an ordinary gas would do.

Some physicists had suggested that the emanation was not material, but consisted of centres of forces attach-

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ed to the molecules of a gas with which it was mixed. This objection was, however, removed to a very large extent by Rutherford, who showed that it possesses the property of condensation under extreme cold peculiar to gases. In this way it can be separated from other gases with which it may be mixed. Even when in the condensed condition it possesses all its characteristic properties.

The density of the emanation can be determined by its property of diffusion, which can not be arrived at directly owing to the small qua ıtity of the emanation available. The rate of diffusion of gases into one another decreases with increase in their moleculer weight. If the coefficient of diffusion of emanation into air lies between too values obtained for other gases whose molecular weights are known, then the molecular weight of the emanation must lie between those of these gases. In this manner it has been found that the atomic weight of the emanation is found to be 1oo.

In its chemical properties it resembles the inactive gases, helium, neon, etc. It does not effect any reagent over which it is passed. Thus no chemical action can be detected between the emanation and the acids, alkalies, red-hot platinum black, lead chromate, magnisium powder palladium black and zine dust. Even after sparking wlth oxygen in the presence of ackalies, it remains the same.

It differs from other gases in not being permanent. It undergoes transformation into other products according to an exponential law. The valume of the emanation consequently decreases at the same rate at which it suffers disintegration by expelling an *alpha* particle. These changes may be graphically represented thus:—

$$\text{Radium} < \begin{matrix} \textit{Alpha particle} \\ \text{Emanation} \end{matrix} < \begin{matrix} \textit{Alpha} \text{ particle} \\ \text{active deposit} \end{matrix}$$

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Emanation and Radium compared.

An apt illustration of the wonderful ways of nature is seen when we compare the emanation with its parent radium. Radium is a silverwhite solid, the emanation a gas. Radium is extremely reactive taking fire on exposure to air, burning paper (and sticking to iron) while the emanation is extremely inactive even to the most reactive reagents. The solid is closely allied to barium with an atomic weight of 225, while the gas has got an atomic weight of 100. The only resemblence between the two is the property of radio-activity which is shared equally by both. Had we not seen the direct production of the emanation from radium, there would have been no reason to believe that there is any relation between the two.

The activity of the emanation decreases exponentially *i. e.* in about 4 days the activity becomes one-half, in the next four days one-half of what was left, and so on until a a stage is arrived at when the activity decreases not exponentially but in a very capricious, irregular manner.

PRODUCTION OF THE ACTIVE DEPOSIT.

Discovery of active deposit.

We have seen that radium generates emanation. The interesting question whether emanation like radium gives rise to anything in its turn, was answered in the affirmative in an unexpected manner by M. and Mme. Curie They observed that bodies when left near radio-active substances become themselves radio-active *i. e.* get radio-activity excited or induced in them. This phenomenon was at first thought to be due to some subtle change, in the nature of the bodies exposed, brought about by some peculiar influence falling upon them from the radio-active substances. But this view was soon shown to be untenable, as the same effect was noticed even when bodies were screened from the direct radiations from radium.

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However, if the radium were enclosed in glass or mica, thus stopping the escape of emanation, no inducd activity is observed. Hence it is not unreasonable to attribute the observed effect to the direct action of the emanation. This view is strengthened by the following considerations, (1) the property of producing this indued activity is not shown by radium which has been freed from the emanation, and (2) the ratio between the amount of emanation and the induced activity produced is always constant. These facts are at once explained, if we regard emanation as the parent of the active deposit, for as we shall presently see, this induced activity is due to something solid diposited on the bodies exposed.

Properties of the Active Deposit.

It can be readily shown that this induced activity is only limited to the surface layers of the body, for when these are removed either by rubbing with emery paper or by dissolving in nitric acid, the activity goes away with the dust or the solution obtained. If the latter be evaporated, the residue obtained becomes active. The activity can be removed also by dissolving in reagents which have no dissolving action on the body. All these facts point to the conclusion that activity must be due to a superficial film deposited on the surfaces of exposed bodies. This view is also supported in another way. We have seen that if left to itself, the emanation decreases in volume. It follows therefore, until there is an actual destruction of matter, that the emanation must change into something else equal in mass to itself. From these observations we conclude that the emanation condenses, so to speak, into a solid substance, to which Rutherford has given the name of "active deposit."

There is one very remarkable property about this active deposit. If the radium emanation be kept closed in a vessel and into it be introduced two rods, one charged

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with negative electricity, while the other being quite uncharged, it will be found that almost all the active deposit adheres to the charged rod, totally neglecting the other one. Since we know that negative electricity attracts positive and *vice versa,* it is to be concluded that the deposit is positively charged. Whether it becomes charged at the moment of its formation from the emanation or subsequent to its separation from the emanation which produces it, the question is not cleared as yet. Certain experiments by Soddy have shown that the deposit at the moment of its formation is uncharged, but the results lack confirmation and we are as far away as ever from explaining how the deposit becomes charged positively afterwards as our experiment shows.

Just as the activity of the emanation decays with time *exponentially*, so the active deposit also loses its activity with time, but in a more complicated manner than the emanation does. It will be remembered that radium yields three kinds of rays, *alpha*, *beta,* and *gamma*. But it is true only of that specimen of radium which contains the emanation occluded in its body as well as the active deposit. It has been found that radium gives only *alpha* rays, as also its emanation, while the active deposit gives *beta* and *gamma* rays but no *alpha* particles. Thus if a sample of radium be enclosed say in a glass vessel which totally arrests the passage of alpha particles, but allows the more penetratng *beta* and *gamma rays*, we can measure the activity due to the active deposit. Thus any decrease or increase in the beta and gamma rays activity would correspond to decrease or increase in the quantity of the active deposit as such. It is found that at first the activity increases until a certain limit is reached and then becomes constant for a while. This corresponds to the stage at which as much active deposit is produced, as is lost by decay.

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Changes in the Active Deposit

The changes that take place in the decay of active deposit are far more complex than those which take place in radium or its emanation. It is found that during the first four minutes the activity falls off very rapidly with time then it remains stationary for a time, when it again begins to decrease though not so rapidly as in the first instance. Professors Rutherford and Soddy have put forward an explanation of this series of changes, which makes the observed phenomenon quite intelligible. We would content ourselves by giving the results, not entering into the reasons which led to these, for mathematical details and technical methods however necessary they may be for arriving at the results, are seldom necessary in presenting them. It was concluded that the following changes make clear the behaviour of the active deposit:—

Radium (A).

(1) The emanation transforms itself into a product called radium A, which emits only *alpha*-rays and has a period of (*i- e.* loses half its activity in) 3 minutes.

Radium (B).

(2) Radium A changes into radium B which is a ray-less product, giving no rays and with a period of 21 minutes.

Radium (C).

(3) Radium B is transformed into radium C, which has a period of 28 minutes and gives all the three kinds of radiations, *alpha, beta* and *gamma*.

The changes do not end here. Although much of the activity is lost on reaching radium C, but still there remains a small, measurable activity, which is more persistent than the former one. The changes, according to Rutherford in this second deposit are:—

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Radium D.

(4) Radium C goes over to radium D, a rayless product, which is probably half transformed in 40 years.

Radium E.

(5) Radium D is transformed into a *beta*-ray product which loses half its activity in about 6 days.

Radium F.

(6) The last product of the series radium F, gives only alpha rays and decays to half value in 143 days. Professor Rutherford regards radium F as the last disintegration product of radium. The highly interesting question as to the substance into which radium F disintegrates will be dealt with later on.

Changes in Uranium

Similar kind of changes take place in other radio-elements, so we would not mention them here, but would say something about uranium, which would help us in tracing the relation between uranium and radium. It undergoes only one change before its activity vanishes. By adding aminonium carbonate to a solution of uranium salt, we get a residue, which Crooker found more active than an equal quantity of uranium itself. After the separation of this brown precipitate, the activity of uranium decreased. However it gradually increased with time, whereas the activity of the brown precipitate decreased gradually. This brown precipitate is called uranium, the unknown substance from uranium.

The following table will give a general idea of the disintegration products which are formed in the decomposition of uranium and radium:—

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Radium, Uranium and their degradation products.

Products.	Time to fall to half value.	Nature of rays.	Properties of products.
Uranium	22 days.	*alpha*	Soluble in excess of ammonium carbonate; soluble in ether Insoluble in excess of am. Carbonate, soluble in ether and water.
Uranium ×.		*beta* + *gamma*.	
?			
Radium.	1300 years.	*Alpha*.	Resembles baruim, but more electronegative; *halides* soluble and corbonates sparingly soluble.
Emanation.	3·8 days.	*Alpha*.	Chemically inert gas; condenses at low temprature-150° C.
Radium A.	3 minutes.	*Alpha*.	Deposited on bodies; concentrates on cathode, soluble in strong acids; volatile at 1000° C.
Radium B.	21 minutes.	No rays.	Precipitated along with barium; soluble in strong acids, volatile at 630° C.
Radium C.	28 minutes.	*Alpha, beta and gamma.*	Deposits on copper or nickel; soluble in strong acids; volatile at about 1000° C.
Radium D.	About 40 years.	No rays.	Possibly radio -lead, soluble in strong acids; volatile below 1000° C.
Radium E.	6 days.	*Beta* and *gamma*.	Soluble in hot acetic acid and volatile at about 1000° C.
Radium F.	143 days.	*Alpha*.	Probably polonium, deposited on bismuth; volatile at 1000° C.
?			

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SOME RADIO-ACTIVE PROCESSES.

The things above recorded, would perhaps be not of much interest to the general reader, who feels contented with the results arrived at without following the logical steps which lead up to these; but to those readers who are blessed with a scientific bent of mind and who would rather like to take one step after the other, it would have been a wide gap between what we have described in our first article and what follows, had we omitted the subject treated hitherto in the present article. However we shall now describe something, which with a little attention will not only arouse the interest of the general reader, but would also prepare him to grasp fully and enjoy the startling and hitherto unbelievable achievements of modren science.

TRANSFORMATION OF MATTER.

Discovery of Helium.

Previous to 1894, it was believed that the only, to all practical purposes, inert constituent of our atmosphere was nitrogen. Hence all the gas, which was left after separating the other gaseous constituents of air, such as oxygen, carbon dioxide and ammonia, etc., was entered into as nitrogen and this inspite of Cavendish's brilliant experiment pointing to the presence of some foreign substance in atmospheric nitrogen. But in 1894 Lord Rayleigh and sir William Ramsey announced that besides the gases hitherto known, there was yet another inactive constituent of air, which they succeeded in separating. This they named Argon. Thus it became clear that great caution is to be exercised in stamping any naturally occuring inert gas as nitrogen. Certain minerals, for instance Clevite, on heating give an inert gas, which as usual was regarded as nitrogen. But in the light of the discovery of Argon, Sir William Ramsey thought it worth while to

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make an exhaustive examination of the gas before calling it nitrogen. His researches showed that it was neither nitrogen nor argon, but quite distinct from the two, having a spectrum corresponding to the spectrum obtained by Sir Norman Lockyer for helium in sun's chromosphere. At the time of Lockyer's discovery it was thought, that helium is a substance not to be met with on this planet of ours, but in 1895, terrestrial helium was discovered by Ramsey.

Production of Helium from Radium.

Helium is a very light gas, its atomic weight being only four times that of hydrogen. It is more volatile than hydrogen and is chemically quite inert, not entering into combination with any known substance. It is the only gas which has hitherto resisted all attempt at liquification.

Having given an account of the discovery of helium, we shall now see what connection it has with radium. Since the end products, resulting from the degradation of redio-elements are inactive, they are incapable of rapid disintegration, and as such they must in the course of geological ages collect in some quantity in the radio-active minerals and must be found associated with them. In searching for a possible disintegration product common to all the radio-elements, the presence of helium in such minerals is noteworthy. The production of the inert radio active emanation from radio-elements, suggested the possibility of one of the end products of the disintegration of these elements being a chemically inert gas. Further it was shown that *alpha* particles are material in nature and the ratio e/m (charge over mass) for these particles indicates that if *alpha* particles consisted of any known kind of matter it must be either hydrogen or helium. From these considerations, Rutherford and

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Soddy, suggested in 1902, that helium might be a disintegration product of radio-elements.

It was known that when radium bromide dissolves in water, it gives out hydrogen and oxygen, along with the emanation. After separating hydrogen and oxygen and removing carbon dioxide whose presence was detected spectroscopically, the emanation was introduced into a tiny vacuum tube, and its spectrum examined when it was found to be different from any known spectrum. After a few days, however, this unknown spectrum faded away and give place to the spectrum of helium, in which the characteristic line D.3 was distinctly visible. The experiment fully demonstrated the fact that the emanation produces helium as one of its disintegration products. These results were confirmed later by the work of Curie and Dewar, Himstedt and Meyer and others.

Thus it was concluded that radium emanation generates helium. The conclusion, however, can be objected to in two ways. The emanation may be itself helium or helium might be present from the very beginning. Both these objections can be answered easily. The emanation can not be helium, for in the first place, helium is not radio-active and secondly, helium spectrum was not present at first when the quantity of the emanation was at its maximum. The second objection is also to be brushed aside for the same reason, *i, e.* absence of the spectrum lines of helium in the beginning of the experiment. The fact that helium spectrum appears after the emanation had remained in the tube for some days, proves conclusively that helium must have been produced from the emanation.

Alpha Particles constitute Helium.

The appearance of helium in a tube containing the emanation may point to two conclusions: (1) that it is the *alpha* particles which constitute helium

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or (2) helium is the final product of disintegration of the emanation. The second view is excluded when we consider that the emanation behaves like a gas of heavy molecular weight, hence after the expulsion of a few alpha particles, the final product obtained should have atomic weight comparable with that of the emanation. On the other hand, as we have said before, this ratio e/m points to alpha particles being atoms of helium.

We know that alpha particles are projected with very great velocity, so some of them must penetrate into the walls of the vessal which contains the emanation. Hence if the tube in which the emanation has been kept stored for some time, be heated, it would evolve helium. Ramsey and Soddy have observed that in some instances, a slight amount of helium is so detected.

X The similarity of the *alpha* particles from the different radio-elements shows that they consist of expelled particles of the same kind. Hence each radio-element must give helium. This is found to be the case. Thus we arrive at the view that all the radio-elements are, at least in part, built up of helium. The theory that the heavy atoms are all built up of some simple fundamental unit of matter has been advanced by many chemists and physicists from time to time, but to this anon.

Thus we see that the disintegration hypothesis has obtained its strongest experimental support from the production of helium from radium. This also accounts for the presence of helium, which had hitherto remained inexplicable, in many minerals, as well as in many spring waters. Ramsey's and Soddy's researches have shown that these minerals and mineral waters which contain helium also show the property of radio activity.

These results, suggesting as they do the possibility

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of the transformation of matter, are of extreme importance. The alchemistic attempts at the transmutation of metals, examined in this light, are to be regarded no longer as idle dreams incapable of realization, but their failures must teach us to honour these as the persistent efforts for the attainment of a grand generalisation. In spite of the utter failure of the chemist to effect the smallest transmutation of elements into one another by any known process, it was felt secretely that such a thing was possible, for there were cartain relations between the elements themselves, which pointed towards their having something in common. For the present we must leave this interesting question, hoping to deal with it in detail in our next.

LIFE AND ORIGIN OF RADIUM.

Decay of radium.

We know that radium is constantly evolving gaseous emanation, which further changes into other products. Now since the reverse process, *i. e.*, the production of radium from its disintegration products does not take place, the amount of radium must decrease with time. As seen above the half-life of radium is calculated to be 1,300 years. One gramme of radium, if left to itself, would be reduced to half a gramme in 1,300 years; to one quarter in next 1,300 years and so on until a time would come, when to all practical purposes it would be reduced to nothing. Rutherford has calculated that only one-millionth part of any amount of radium would be left in 26,000 years. Our earth if it be wholly made up of radium, 26,000 years after, would show no more activity than a good specimen of pitchblende does at present.

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Production of Radium from Uranium.

There can be no doubt that our earth has been in existence since many million years. The radium now procurable can not have been in existence in the earlier stages of the earth's history. So we are at once driven to two conclusions. Either the radium was in some way suddenly formed in comparitively recent periods or it is being continuously produced at all times. The first of these assumptions, being highly probable must be rejected. The second view which is also supported by experiment, we shall now consider.

There are two ways in which radium may be produced, either from nothing or by the transmutation of some other substance. The first of these views being in direct contradiction to the principle of the conservation of mass requires no serious attention on the part of the scientist. So we are left with the only other alternative that some substance or substances are continuously changing into radium. What can these substances be ?. It was early suggested by Rutherford and Soddy that radium might be a disintegration product of one of the radio elements found in pitchblende. Both uranium and thorium fulfil the conditions necessary for being the parent of radium. Both are present in pitchblende; both have higher atomic weights than radium and both have a rate of change which is slow as compared with that of radium. It has been observed that minerals rich in radium contain more uranium than thorium, showing that more probably uranium is the parent of radium. This theoretical conclusion is supported by facts as well.

If the above view be correct, then the ratio between the amounts of uranium and radium in a mineral ought to be constant. The question has been solved to a very great extent by McCoy, Boltwood and Strutt. McCoys' results

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indicated that the activity observed in the minerals was very approximately proportional to the contents of uranium in them. But the activity observed may be due to not only the radium present, but also some other radio-elements. Hence Boltwood and Strutt attacked the problem more directly by measuring the relative amount of radium emanatiom evolved by different minerals. With the exeception of certain minerals (monazities), the numbers obtained show a surprising agreement, thus affording a direct proof that the amount of radium in minerals is directly proportional to the amount of uranium. The weight of radium in a mineral per gramme of uranium is thus a constant quantity. It is calculated that in a mineral one ton of uranium must be associated with 0·72 gramme of radium.

The production of radium from uranium, while very strongly supported by above experiments, can not be taken for granted, unless direct evidence for the same is forthcoming. Soddy took a certain quantity of uranium, freed it completely from radium and kept it for sometime when he found that some emanation was present showing the formation of radium. If uranium is the direct parent of radium, the amount so produced is no doubtless than what would be expected on theoretical considerations. Some experiments by Boltwood and Rutherford have shown that uranium no doubt produces radium but through certain other transformation products. We have already seen that uranium gives uranium. Boltwood found that ionium, another adio-element, is also produced in uranium solutions. It ls very likely that ionium gives radium.

Thus it appears that though uranium is an ancestor of radium, it is not the latter's direct parent. The line of decent is apparently from uranium to ionium and then to radium thus :—

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Uranium—> Uranium—> Ionium—> Radium.

3. HEAT OF THE SUN.

All those blessed with eyes, enjoy almost daily, the luminous orb, which bathes the whole world with its bright effulgence as it rises in the East. For the whole day long it bestows upon living beings, its life-sustaining, disease-destroying and happiness-giving light and its twin sister heat. The painter's brush and the poet's pen have pictured in vived colours the effect which this grand spectacle produces on human mind. There are certain questions however, for instance, what is the sun, how was it created, why does it first rise in the East and not in West, why do its revolutions follow a regulated course, how does it light up, what is the source of so much energy in it, etc., etc.; which never strike a painter's mind, while the poet finds and gives consolation in ascribing the cause of all these as the undescribable and unknowable ways of Creator. To give an answer to these questions, as far as human intelligence can go, is the sphere of the scientist. Let us see what answer science gives to the question of the Source of sun's heat and light. The sun being separated from our earth by so vast a distance, every answer as to its nature must be theoretical, except in as far as it depends upon phenomena, which we can observe at this distance. Prior to the discovery of radium, three different views had been advanced to account for the flood of light and heat which we daily receive from the sun.

Self-Cooling' Hypothesis

First, it was supposed that originally the Sun was a hot body, consisting of molten matter and thus possessing an enormous store of heat. It is gradually cooling and is during this process of cooling that it envolves heat. The sun loses its own heat which is transmitted to other planets. This explanation is plausible enough, but for one chief drawback. We can detremine the amount of heat which reaches one square yard on the surface of the earth, in one hour from

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the sun and from this the total amount of heat given by the sun can be calculated, assuming that an equal amount of heat is given in every direction. Our calculations lead us to so high a number, that, if that amount of heat be taken per hour from the sun, it must become perceptibly cooler day by day. But this does not happen, hence the insufficiency of the hypothesis to account for the sun's heat.

Combustible Hypothesis

Secondly, the sun was assumed to contain a good deal of combustible substance and it is owing to their combustion that we get heat. But this view is also untenable. Had the sun consisted entirely of the most powerful combustibles known, the source of supply would not last long enough.

Helmholtz Hypothesis

The third view due to Helmholtz, has until lately exclusively held ground. We know that heat is generated if one body falls upon another, as is seen in the case of constant hammering. So it was supposed that the outer portions of the sun's body are falling upon the inner one, thus generating the heat we receive.

Radium Hypothesis

The discovery of the wonderful supply of heat by radium as it disintegrates, has now suggested quite another explanation of the suns' heat. Thus if the sun contains a little more radium than a specimen of the best pitchblende *i.e* about $2\frac{1}{2}$ part per million, we would not have to seek elsewhere for the source of our heat. There is a scientific instrument called "spectroscope" which is able to detect very very small quantities of elements, but it entirely fails to detect any trace of radium in the sun. However there is an indirect evidence which points to redium as a constituent of the sun's' body. We have already seen that helium is a disintegration product of radium and the spectroscope

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reveals the presence of this gas in the sun and indirectly that of radium. There was one imprortant objection to this theory. If the sun contains radium, why it is that radiations from it do not affect the electroscope. The simple answer to this objection is that the sun's radiations have to travel through so many miles of the atmosphere, that before reaching us they are all absorbed and utilized in ionizing the upper layers of the atmosphere. Hence it is that we do not feel their effect below. According to this view the source of suns' heat is fully explained and accounted for.

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National History

'National history' has a permanent value for the nation.

National history alone is the symbol of a nation's "eternal Self." It is the embodiment of all that is of permanent interest in national life. A country undergoes constant changes in customs, in habits of thought, in religion, language and dress. The English were once Roman Catholics, now they are Protestants. The Parsis of Iran became Musalmans; and both the Hindus and the Mohemadans of India are fast becoming Christians. The feudal Japan of fifty years ago, has become a 'Modern Power' which implies a radical change in her old polity, social system and religion.

In every respect indeed, the old order changeth yeilding place to new. National history is that golden chain which links the past with the present and the future. It keeps alive in a people the spirit of unity; inspires them with common ideals, infuses in them common interests and common sentiments. The political and religious doctrines, philosophy and customs which were once considered to be most useful, cease to be so in course of time.

But *National History* has a permanent value for a nation. It is the basis of national unity and morality; it is the axis around which the wheel of national life revolves for ever. Among the transient institutions of a nation, history is the one eternal institution! The nation whose history is alive, is never in danger of decay from internal

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causes. Hence all civilised nations look upon the preservation of their history as their sacred and paramount duty.

METHODS OF POPULARISING NATIONAL HISTORY.

(1) *The celebration of national festivals.* Rejoicing on days which are considered sacred on account of their association with some famous names and events, is an easy and obvious method of making national history popular. The Empire Day is celebrated in England in memory of the late Queen Victoria, to remind Englishmen of their duty towards the British Empire.

The Ramlila, similarly, reminds the Hindu nation of their ancient glory, and holds up before them the ideals of rigeteousness which inspired their ancestors.

(2) *Calling towns, streets and other public places and institutions after the names of the national heroes :—*

This custom is found all over the civilised world. Englishmen have christened the Nicholson garden in Delhi in memory of General Nicholson of the Mutiny fame.

Most of the streets and alleys of Paris are named after their great French hero Nepolean Bonaparte.

The Mayo College at Ajmere and the Aitchison College of Lahore for the education of native Princes, were so named in honour of two great Anglo– Indian officials.

(3) *Erecting of tombs and Statues in memory of great men.* Only a few Indians would care to read the lives of the Moghal Emperors but the tomb of Humayun in Delhi and the Taj at Agra are visible episods which no one can ignore.

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This principle explains to an extent the custom of the so called idol—worship in India. Malir Swami, Sr. Gautam Bhudde, Sr. Krishan Maharaj and Raja Ramchandraji are our national heroes and it is natural that we should preserve their memory by erecting their Statues.

(4) *We should call our chidren by names which are sacred and dear to us.* All English boys are either Nelsons, Georges., Williams and Olivers ! Scotchmen are Andrews and Bruces, and Irishmen are Patricks. But who has ever heard an Englishman or woman—except Mrs. Annie Beasant who calls herself Bibi Basanti, being called by a Hindu name.

And yet I know of a 'Hindu' who has named his boy "*Curzan Dass !*;" and another Bengalee who calls his daughter "*Ripon Bela*" and funniest of all fun; I know a Hindu girl who is called "Tom"!

This shews most vividly how denationalised some of us have become.

Let us not commit national suicide by forgetting the obvious duty of giving good "Hindu" names to our children.

(5) *National history in Poetry.* Excepting, perhaps the Vedas, no books are held in greater esteem by the Hindus, than the Ramayan and the Mahabharta. Sage Vyas and Saint Valmiki were perhaps the greatest poets of the world, and they chose for their themes the history of Ancient Bharat.

In every age and in every country, poetry has been made the most powerful means of arousing the national spirit. The tales of national advancement, of suffering in the cause of Truth, and martyrdom for *Dharma* have ever had a fascination for the bard.

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Every effort should be made to *revive* and *improve* the old institution of the village bards (*charans*) and the Kathas.

(6) It is important that the nation should support a number of learned men who have devoted themselves to the study of History, Political Science, Sociology and allied subjects. The community should also provide a number of scholarships to students for the study of these subjects in foreign countries.

In all civilised countries scholars are maintained at the universities, by whose researches in the domain of national history, the nation derives the greatest benefit.

(7) *Teaching of history in National Schools:-* The study of history should be made interesting for the children through patriotic songs and pictures and in various other ways.

Indian histories written by men like Lee-Warner, Leth bridge or Hunter should not be put into the hands of our young men. The harm done to the Hindu nation by these books has been incalculable.

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THE PROBLEM OF LIFE

CHAPTER I

(Concluded)

General Summary. The knowing is Soul, the known or the unmanifested is Nature, the Manifested are the three qualities of virtue, passion and darkness, Intellect, consciousness, the five elemental Rudiments, Mind, the ten sense organs, and the five gross elements, All these when combined with Soul become Nature Manifest.

When water is calm and quiet, the waves, though unseen, yet exist in the water, and the moment a gale begins to blow, the calmness is destroyed, a general commotion takes place and waves are seen to rise on the surface and to separate themselves from water, or rather to take the entire sheet of water within their rolling folds, and nothing but waves are seen to rise and fall and to rise again. In like manner, Soul, like water, is calm and quiet, Nature, like waves, is unseen, yet exists in the Soul; the moment, by force of Divine Will, the three qualities, like a gale, appear, the calmness and inactivity of the Soul, like that of water, is destroyed, a general disturbance takes place, and Nature, like waves, is seen to rise on the surface in all her phenomenal splendour, and to ordinary view to separate herself from Soul, as waves from water, and all we see is Nature in diverse manifested forms. This points out the theory, that Soul, and Nature are one and the same, and that the seeming distinction is caused by the unequal admixture of the three qualities, when to all outward appearances, Soul vanishes and Nature alone seems to smile in her resplendent glory. It is this distinction that has taken and will take, even to eternity, some of the best thinkers to different lines of thought. A few maintain the non-existence of Soul, a few

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hold that Souls are many, while there are many such as assert the existence of One Supreme Soul.

As for those who totally deny the existence of Soul; the Highest Intellegence, that breathes throughout the creation, is a sufficient guarantee to convince them, if they are at all open to conviction, of the certain existence of an All-intelligent Chemist working unseen and unknown behind the vast laboratory of Nature.

Again those that maintain that Souls are many, and that each Soul is trying to gain experience, and is struggling hard towards liberation, and that if there was one universal soul, there should be one universal birth, one universal death, one universal condition, one universal pleasure or pain at one and the same time; that if one lost an eye all others must lose it simultaneously, if one became deaf, the rest must simultaneously lose the use of their ears, and so on, have yet to prove whether in our existing solar system the Sun is one or many. We know that the sun is one, and that it equally sheds its light on Moon, earth, planets, stars, nay on every atom that exists in Nature; and that it is the difference in the recipients, for instance in the moon, that makes her wave and wax, in the planets and stars that makes them look of various shapes, sizes and colours, yet all these and others do not change phases when the moon does so, nor does the moon ever imitate them in any or many of their different conditions.

In short, feeling the influence of one sun all do not seem or act alike.

In a similar way in a thousand pots of water of variegated colours, in thousands of rivers and lakes, in all the oceans and seas it is the *one* sun that casts its reflection retaining at the same time its own position and its own splendour. If the water, in certain places, is

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steady, the reflection of the sun, too, seems steady, if, in certain other places, it is unsteady, the reflection, as well, seems unsteady. Having one sun, the steadiness or the unsteadiness is thus not universal at one and the same time. In panes of different shades of colour the reflection of the sun is not as the sun appears to be, but like the colour each pane possesses. The change is thus necessarily due to the varying conditions of the cosmic stuff and not to the multiplicity of suns or souls.

Following the above illustrations the Soul is one and like the sun, inspires the different modes with His Divine Essence. The inspiration is alike in all. It is the difference in modes and the qualities that each mode is subject to, that makes one look like a man, another like an ape, another like a bird, another like a plant or a stone, another like a lame man another like a blind man and so on.

As one sun distributing equal heat can not simultaneously produce warmth in water and in stone, it cannot prevent the snow from melting, and the water from evaporating, it cannot but kill some, and save others, it cannot but afford pleasure to one and pain to another, so the one universal Soul cannot equally instil pleasure or pain into all at one and the same time. As the one sun distributing equal light cannot produce equal brilliancy in glass and in stone, it cannot but simultaneously scorch some while polish others, so the one Universal Soul cannot bring about simultaneous birth or death to all. Each mode feels pleasure or pain, or is subject to birth or death, in proportion to the qualities and conditions which each mode possesses or feels. In verse 33 of the 13th discourse of the Bhagwat Gita the Lord says to Arjuna "As only one sun, O! descendent of Bharat, illumineth the whole world, so doth the knower of the field shine over all the fields." The field is the body, and knower thereof *i. e.* the Soul are not separate from the Supreme Being. He who once realises this attains supreme beatitude.

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In short, the Soul seems absent from our mortal, hence indiscriminating, sight, yet He has presented us with numerous Divine illustrations which, if viewed with the eye of discrimination, prove to satisfaction that what is true of these must be true of the One Unseen and Unknown.

Thus the Soul is one and universal. It is in unity that there seems diversity. The unity consists in births and deaths, diversity, in high and low births, different grades of stations and conditions in life, early and mature deaths and so on. Actions, influenced by the three predominant qualities, cause all this diversity in Nature.

In the world we inhabit different sovereigns rule over different kingdoms in diverse ways. The rule is one, but the ways of ruling are different. Each one is independent of, and hostile to, the others. There is utter want of mutual help. In like manner if Souls, like kings and queens, are many, each Soul must be independent of, and hostile to, the rest, each one must look to his own interests without caring in the least for those of others. Under such circumstances they do not, and cannot, mutually help one another. But we see that no single Soul can be born without the mutual help of two different sexes. It is the union of two such that brings forth the third. Thus if souls were different and many, such a union could not be possible. Hence souls are not many but there is only One Soul and that one is universal.

Again an emperor, as one, rules over many petty kings, conveys his own sense of Government to all, expects one and all to work conjointly and harmoniously towards one common end, and that end is the general welfare of the entire Government of which he is the supreme ruler. He rewards those who govern well, and punishes those who govern badly. In different states there are slight differences in laws to suit the differences

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in manners and customs. All these are diversity in the unity of Government. In like manner in the universe from unity there comes diversity; the oneness freely breathes in all the subsequent diverse forms and natures. Slowly and gradually there rise different sorts of bodies with different grades of egos, the latter to govern the former. As in the case of the temporal world, all petty kings mutually help one another and conjointly work for the sake of their common emperor, so these egos of different natures and grades, influenced by qualities of difierent ranks and degrees, for the sake of Soul mutually help one another in the act of creation, protection and destruction, for what is true of the temporal is equally true of the spiritual. The former is nothing but the exact reflection of the latter.

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Some Shortcomings of Modern Science.

A time there was in the history of mankind, when science was accorded a position no better than that of witchcraft or sorcery. Those who dared to follow in its footsteps were treated as criminals of the blackest dye, criminals against society, against state and against religion. They were charged with the foulest crimes of breaking the law of the land, trampling under feet the interests of society and dealing deadly blows to the happiness of humanity. There was no punishment which was too great for them. They were cast into life-long imprisonment, burnt at the stake and tortured to death. And why all this? For the simple reason that they had forced dame nature to lift a little the veil of secrecy with which she had so long concealed her beautiful face. Giordono Bruno, not to go any further back, was tried for heresy, cast into prison for six years and because he entirely refused to recant was delivered over to the secular arm and burnt at the stake in the year of grace 1,600. What was his crime? The simple fact that he refused to give up his support to the Copernican doctrine of the motion of the earth which he maintained so strenuously. What of poor Galelio? He was summoned before the Inquisition in 1,633 and was ordered to renounce his great discoveries and the confirmation which he lent to the discoveries of Copernicus, but his "E pur si muov" (= and yet it moves), sent him to prison. The next year he was banished from his dear and near ones. It was during this exile that the old man after undergoing various bodily ailments and sufferings in the form of sleepless nights, excrutiating pains, blinded vision and hectic fever breathed his last in 1,642. Yet the wrath of the Inquisition was not satiated. The sentence of "handing

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over to the secular arm to be dealt with as mercifully as possible without the shedding of blood"—this hypocritical sentence signifying nothing more nor less than burning at the stake—was carried out on his lifeless body and writings. What avails it to multiply instances? Suffice it to say that many were the tedious days and troublesome times through which science had to pass during its infancy.

But those were days of peevish prejudice and cursed conservatism, blind bigotry and fierce fanaticism. Times changed as they must. As everywhere else, here too persecution failed to achieve its object. Gradually and slowly science began to assert itself. In every department physical, chemical, biological, physiological etc., a marked improvement became perceptible. We shall not follow science on its course of conquest during the last centuries, but shall content ourselves with a glance over its achievements in modern times. Here we find it victorious all around. There is no field of human activity which does not bear its hall-mark. A branch of knowledge without the word science prefixed to it gains but scant respect. Hence we hear of theology, sociology, Philology and History etc all defined and treated of as branches of science. At the magic touch of science, everything however trivial and insignificant it may be gains in importance a hundred and even a thousand fold. The unconvincing theorist or the unreasonable hypothetist is sure to gain a hearing provided he has the wit to explain his useless nay even harmful views on scientific bases. Mischievous cunning and ruinous fraud, unlawful debauchery and unsatiating lust, horrifying cruelties and hedious murders, all are sure to go unpunished when protected by the all powerful hand of science. It is no use dilating upon the subject any longer. Every thing is said in the words, "Victory dogs the footsteps of science".

In these days of twentieth century civilization, when steam engines and motor-cars have replaced the wearily

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moving stage-coaches and ox-carts; when everwatchful clocks and watches have antidated the not-ever-useful sun-dial and sand time-keepers; when beautiful-and-ever fresh-article-producing-machinery and mills have relieved us from the pains of sluggish and coarse hand labour; yes in these days of photography and glassware, telescopes and stereoscopes, pianoes and gramaphones, steam and electricity, Marconie's installations and aeroplane flights,t he man who dares to lift his voice against science, the mother of all these wonderful achievements, is sure to be stigmatised as the greatest enemy of civilization and culture whose heated imagination born of perverted intellect and deranged brain finds flaws in science and wants to deprive humanity of its only " friend, philosopher and guide. " Nothing but derision and cheap disdain shall be his lot. He is sure to be condemned unheard.

But truth must be told regardless of the bitterness of feeling that it may cause and the use of opprobrious and contumelious language that it may provoke. The warning must be sounded lest science to the utter misfortune ofitself and humanity be engulfed in mouth-open chasms and bottomless pits which abound in the way of down-fall and destruction which it is so precipitously following. What would be the fate of our voice we are not anxious to speculate on. Whether it would strike against some responsive heart or be drowned in the vociferous scientific songs does not concern us. The great Swedish savant Berzelius has truly remarked. 'In the treatment of scientific subjects, a man must have neither friends nor foes. He combats what appears to him to be an error without any reference whatever to the personality of the writer who advances it." Placing this ideal before our view, we want to make some observations on what appear to us to be some of the shortcomings of modern science. At the very outset we must tell our readers that these defects creep in only when a certain assumption is made which in the case of science

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as practised now a days is only too true. Our remarks, as is apparent, are applicable to modern science alone.

It has a tendency to breed insolence and conceit. The suggestion may perhaps appear revolting to some and ridiculous to many. But it is neither the one nor the other. A little reflection will convince every body of its truth. The scientist enters his laboratory and finds it decorated and furnished with delicate apparatus and appliances, the product of intellectual labour and scientific genius of many a methodical mind and vivacious brain. With their aid he sets to solve a certain problem of nature. He fails in his first attempt and many subsequent ones. But failure daunts him not. At last his passionate ardour and unlimited zeal coupled with never-yielding patience and unrelenting forbearence carry the day. Jealously gaurded secrets of nature which had hitherto baffled all attempts at unraveling now become public property. A smile ofsatisfaction and self approbration curls the investigator's lips. He may, well, feel proud of his achievements when along with them he learns the precious lesson of never to be dispirited by failure. Week in and week out, alternative failures and successes chequer his otherwise calm and quite career. But alas his buoyancy of spirit and sprightliness at the time of success make him blind to the worm of conceit and insolence which is creeping into his soul, silently slowly but steadily all the time. Every success accelerates its speed. It is sure to find a footing, if the mind be not, from the very beginning, fortified against all such invasions. The fact that he has gained a victory, however small, over nature, makes him a bit proud of his powers. The cumulative pride reacts on his mind and engenders in it a sense of self-importance which as time advances concentrates into conceit. Again his laborious research and exhaustive toil tell him with what an exactitude and positiveness nature obeys its laws. How

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unbending, uncompromising, and absolute it is in this respect. The constant brooding over this principle of nature, reflects back with all force and energy upon his untutured mind and makes the latter also smack something of that absolutism. Gradually and gradually it advances into insolence. On account of keeping company with these haughty, unbending, stubborn facts of nature, which know no exception, remain the same in all lands and at all times, never yield a hair's breadth, never retreat and never budge, the scientist acquires an arrogent and over-bearing habit of mind. Talk to him on any subject and it will at once become apparent. The propositions that he advances, however flimsy and untenable they may be, are sure to be maintained with all the vehemence and force at his command, for his scientific experience has guarded him against failures, so "tho' vanquished, he would argue still." He feels a kind of disdain and scorn for other people's opinions— unscientific they seem to him. The least incoherency or want of logic in them, excites his indignation and disgust, whose injurious effect on other people's minds he sees not.

2. *It tends to cripple the intellect.* Dealing with certain natural phenomena, investigating the conditions under which they appear; the changes which they undergo and the rules which they obey, a scientist engaged in the study of facts, hard facts, gradually loses ground in the domain of intellect. He forgets that all these laws which are the foundation-stone of our science, once had their origin in the brains of philosophers and scientists. They were first given in the form of theories, but our later experience has demonstrated their usefulness by corroborating the conclusions arrived at through them and thus these hypotheses have now acquired the sanctity of law. Had we paid no attention to them when they were mere formulations of hypothetical views and thus allowed them to be

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drowned in oblivion, how much poorer science would have been. In the current number of the Hibbert Journal Professor Loins T. More contributes a very interesting and learned article on "The Metaphysical Tendencies of Modern Physics." In this he deprecates the tendency, which Physics in his opinion has acquired, of devoting too much attention to questions purely speculative. The eminent scientists Lorentz, Larmour and J. Thomson (Lord Kelvin) have advanced many hypotheses as to the nature of primeval matter. But, Professor More says, that as none of these is satisfactory it is no use going on speculating and speculating. It is only building toy houses. What need have we of such theories and facts when they fail to explain all the known facts. But perhaps the learned professor has not realised the state which, his suggestion, if carried out would lead to. Practical science can not but follow theoretical ones. Do away with the latter and the former will cease to flourish. What would have been the state of modern chemistry, for instance, had their been no atomic theory? Yet Dalton was simply guided in advancing his laws of chemical proportions by theoretical views only.

But for the theoretical existence of ubiquitous ether, physicists would have found it very hard to explain the transmission of light. How could it have been possible to prove the ponderable nature of light? Professor More admits that a rutheless and complete elimination of hypotheses is not desirable. But the perusal of his article leaves an impression on the mind that he is an out and out enemy of hypotheses. Moreover the brain which conceives a hypothesis would not like to stop half-way; it would like to explain as many things as it can. We are not believers in pure intellectualism. But the unhampered flow of intellect kept within bounds by the practical observations of natural phenomena in a truly philosphic spirit appears to us to be

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absolutely necessary for the advancement of science. We often fail in our attempts to do many things, but do we leave them all undone? One wants to learn riding and because the horse throws him down, does it follow that he should give up his attempts as impracticable? Since hitherto we have not been able to give an adequate theoretical explanation of the nature of true matter, there is no reason why we should cease further speculation, specially when we know that scientific speculations are totally different from an unbridled license of the imaginative faculty. They have got their limitations and restrictions which prevent them from degenerating into crude empiricism. They are put forward not without any regard to the past traditions of science or its capabilities of expansion in future. They are only helpmates to science and not its masters. In addition to all these, theories and hypotheses add to the dignity and charm of the subject. The vast array of facts and figures which at times becomes dry uninteresting and tiresome loses much of its vexatious and tedious character when interspersed by revivifying and inspiring theories which have the motive in them to set a-going pleasent and instructive trains of ideas. Fatal would be the day when science bereft of this charming feature degenerates into stereotyped and slavish unoriginal colloquialism.

3. *The third great defect noticeable is in the writings of the scientist.* There is visible a tendency in him to make his writings the sole property of those who are initiated into the mysteries of this experimental branch of knowledge. To those outside the blessed sphere they are unintelligible, uninviting nay even repulsive. This ought not to be. Science is not the property of the chosen few. Those gifted with vision should on no account be deprived from enjoying the light of the sun by enveloping it in shrouds which their intelligence can devise no means to tear asunder. With increasing knowledge of science-true science-the happi-

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ness and well being of the human race is sure to increase. None has a right—not even the scientist—to put obstacles in the fufilment of this aim. The clear forcible and simple style of writing peculiar to the old scientists must once more be revived. The choice idioms, the display of wit and rhetoric, and the terse observations— which have the additional merit of being to the point—detract nothing from the scientific nature of these writings, on the other hand they will make their study enjoyable. This will also benefit the scientist himself, for the noble idea of imparting education to the less advanced is sure to exert a chastening influence on the sympathetically inclined scientific mind.

Again the well meaning criticism of the public will help a good deal in removing many of the defects and angularities of modern science.

(4) The fourth defect, in modern science, in our opinion is its tendency to make its followers one-sided. No doubt the very nature of the subject of a scientist's research and investigation precludes his devotion to other branches of knowledge even to those of science itself. But this is no reason why one engaged in the pursuit of science, should take no cognisance of things which are absolutely necessary for him, for instance moralities and humanities. One-sidedness is always dangerous. Developing one faculty at the expense of others is sure to cause deformity. All those noble qualities and characteristic traits which go to make up the real man, distinguishing him from other sentient beings, should on no account be sacrificed at the altar of science, which on the whole represents only one kind of effort—though a very powerful one—for seeking truth. Truth couched in sweet words, breathing the noble feelings of purity, sympathy and self-sacrifice is always productive of the greatest good. Coarse, hard, unbending truth seldom gains its object. The active pursuit of only one subject produces a very unhealthy influence on the mind. One of

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the greatest scientific figures of modern times, Darwin, thus deplores the condtion of one-sidedness he was reduced, to:--"My mind seems to have become a kind of machine for grinding general laws out of large collections of facts but why this should have caused the atrophy of that part of the brain alone on which the higher tastes depend, I cannot conceive. A man with a mind more highly organised or better constituted than mine would not, I suppose, have thus suffered; and if I had to live my life again, I would have made it a rule to read some poetry and listened to some music at least once every week; for perhaps the part of my brain thus atrophied would thus have been kept active through use. The loss of these tastes is a loss of happiness and may possibly be injurious to the intellect, and more probably to the moral character by enfeebling the emotional part of our nature". (Quoted. Scientific American June 18th 1910.)

How pregnent with noble advice and grand instruction is this wail of one of the greatest pillars of modern science. Indeed how much harmful is this coarse-grained monotony of the scientist which makes him walk in beaten ruts only to the utter exclusion of the supremely charming grassy fields and alluringly fascinating parks and gardens on both sides of the road, a stroll which is sure to refresh his brain, nay entire being, by giving him a chance to see the rich and variegated display of heavenly flowers in their choicest hues and to smell the inspiring air saturated with the fragrant and delicious aroma of this divine creation.

We have purposely withheld ourselves from enumerating the innumerable advantages which science has bestowed upon humanity, for there would be none so foolish as to dispute its usefulness. Those who have the wit to claim, or money to buy, are all indebted to science for placing these advantages within their reach and thus adding to their comfort and convenience in daily life. By yoking

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dead, inert, lifeless matter to the service of mankind, it has conferred on it a boon for which one cannot be too grateful. But in spite of all this, there appear to us to be some shortcomings in modern science which are a blot on its otherwise fair name, a blot which can easily be,—we would not say whitewashed, for this senseless metapher conveys the idea of no permanent change—eradicated by paying only a little attention. We have already said that these defects creep in only if the mind be not fully trained to receive the noble teachings of science. With the advancement of science, prosperity of the human race is sure to increase, for science stands for stern, unflinching truth making no compromise with bigotry, hypocrisy and all that is impious and wicked. In order that this plant of truth may germinate in one's mind and grow untainted and uncorrupted to its full growth, it is necessary that this latter be purified of all obnoxious weeds in the form of unholy passions and wicked desires, fully watered with love, sympathy and benevolence and sufficiently manured with teachings, sound, virtuous and ennobling. We do not want the Goddess of Science to remain seated on the Olympian heights of wisdom beyond the ken of suffering humanity, but to become a divine inspirer living with men below; sharing their joys and sufferings; teaching them lessons of faith, hope and charity and thus raising, ennobling and uplifting fallen humanity.

The greatest duty of a human being is to make himself a proof against the three kinds of sufferings:—आध्यात्मिक (born from within *e. g.* jealousy, greed, anger, disease etc), आदिभौतिक (due to other living beings *i. e.* snake-bite, death lions, wolfs etc. or due to a fight with men] and आधिदैविक (born of natural causes, such as a excess of heat or cold, floods etc.) Science tries to free man from the last two only directly and from the first only indirectly, hence its acquirement alone does not go to make a perfect man. In order

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to make himself and others perfectly happy, it is incumbent upon the scientist to pay proper attention to आध्यात्मिक sorrows and to cure these. If he can find no remedy in this own sphere, there is nothing unwise in seeking it elsewhere. He must have impressed upon his mind truly Dharmic principles as distinguished from dogmas of creed or religion, for failing in this respect, science can not be an unmixed blessing. Conjoin science with yoga, perfect happiness and bliss supreme shall follow at once; separate the two, scientific thefts, robberies and murder with a multitude of other scientific evils, physical, intellectual and moral, will deluge the world with poverty, debauchery, bloodshed and other features of the grossest materialism.

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Criticisms and Discussions

RADIUM AND RADIO ACTIVITY.

Writing about the chemical re-action of radium rays, vigyanand has in the course of an able article on" Radium and Radio -activity" in the Bhadrapad number of the Vedic Magazine, mentioned that glass becomes violet uuder the influence of radium rays and this effect he ascribes to the seperation of its alkaline constituents.

In my opinion this idea is incorrect. The silicas from which ordinary glass is manufactured are, with but few exceptions, seldom obtained in chemically pure conditions and the effects of impure silicic bases become more glaringly apparent in white glass than in coloured ones. To remedy these defects, glass-makers generally use maganese dioxide, a chemical substance often known in glass-makers' parlance as "glass soap". This article, when used in small quantities, has a decolourising effect and is used with this object in most white-coloured glasses. But there is another effect of this chemical in relation to glass-manfacture and that is to produce, under some different treatment, a violet colour.

Under the influence of radium rays, it is probable that maganese di-oxide, which must have originally been used for bleaching purposes, got seperated and in so doing imparted a violet colour to glass.

Since only white coloured glasses seem to have been used in radium rays experiments, it is just possible that this colouratiou, though it is due to different causes, is unwittingly fastened on its alkaline ingredients. So far as I have studied the chemistry of glass making, there is nothing in the chemical composition of alkaline substances generally used in glass that would produce violet colour.

There is an easy way to test the accuracy of my statement. Let coloured glasses in the manufacture of which no maganese di-oxide has been used (such as green glass) be treated by radium rays and if, as I am sure, they do not develop violet colour, the fallacy of this theory would soon be discovered.

Dated 23–9-10. Alakhdhari

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Ancient Aryan Civilization and Culture.

Patrons of Learning in Ancient India.

In the Chapter of Muhabharutu, called Rajudhurmu, we have a large account of the duties of Kings, of which the following is a very abridged extract: while the prince is in his pupilage, he is to be taught every branch of learning, and in his youth, is to be invested with a degree of power necessary to obtain a knowledge of royal affairs. If in these preparatory steps he gives full satisfaction to the subjects, and they express their high approbation of his conduct, he is invested with the regal office. The King is to be awakened in the morning before day-break by a servant appointed to this duty, who reminds him of his duties to the gods and to his kingdom. As soon as he has risen, the pages in waiting repeat the splendid qualities of the monarch; and as he goes out, several bramhuns rehearse the praises of the gods. The King now bathes, and worships his guardian deity; after which he again hears chanted the praises of the gods. He next drinks a little water; and afterwards sees alms distributed among the poor. Then, entering his court, he places himself amidst the assembly; on his right hand sit the relations of the monarch, the bramhuns, and all who are of distinguished birth; on the left, the other castes: very near the King, sit the ministers, and those whom the prince consults on the matters brought before him. In the front, at a distance stand those who chant the praises of the gods and of the King; also the charioteers, elephanteers, horsemen and men of valour. Amongst the learned men in this assembly are some who are well instructed in all the shastrus, and others who have studied in one particular school of philosophy, and are acquainted only with the works on divine wisdom, or with those on civil and criminal justice, on the arts, mineralogy, or the practice of physic; also persons skilled in all kinds of customs, riding masters, dancing masters, teachers ef good behaviour, examiners, testers, mimics, mountebanks, and others, who all attend the court,and wait the commands of the monarch. At noon repeating the names of the Gods the monarch sits down to dinner; and after rising, is amused by singers.....He then retires, repeats the name of his guardian deity, visits the temples, salutes the gods, and converses

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with the priests; and after resting a little, in the midst of a select company of learned wise, and pious men, he spends the evening in conversation on different subjects, and in reviewing the business of the day. During the night, the King travels in disguise, to ascertrin the state of his kingdom, and receives from all parts the reports of spies, dressed in every disguise. It is the duty of Kings, adds the same work, to pursue every object till it be accomplished; to succour their dependents;to be hospitable to guests, however numerous. For their amusement, tney are permitted to hunt, and to visit their pleasure gardens.

The Poorans mention several of the Hindoo kings as having been great patrons of learning. During the Sutyuyoogu in the reign and through the patronage of king Ruhoogunu the sage Juruchurutee wrote a work on divine wisdom. During the reign of Ikshwakoo many learned works were composed. Poorooruvus and Mandhata are also celebrated for their love of learning; the latter, as a great warrior particularly patronised those learned men who assisted him in the art of war. The kings Swaruchee and Nimee are said to have been very liberal to the learned, and to have patronised several works on religious ceremonies. Junuku encouraged the publication of works on manners and civil polity, and patronized scholars of the Vedanta school. Shivee Murooottu and Panjiku, three other kings, patronized the Vedantees. Oosheenuru greatly encouraged learning by collecting the best works, and placing them in his capital, and drawing thither learned men from all parts. In the Treta Yoogu, the sage Katyayunu implanted the love of learning in the mind of king Chaitruruthu, and wrote a work on divine wisdom; learned men of the Vedantu school were also patronised by king Kekuyu. Lomapudu patronised men of talents, whom he invited from different countries; several works on the duties of men, as well as on other subjects, were published under his auspices. Ulurku, another monarch educated by the sage Dattatruyu, assisted in the publication of a work on divine wisdom, and patronised learned men at his Court. Under the auspices of Runtee-devu and Umbureeshu several works on devotion were writien. Urjunu the son of Yudoo, entertained at his Court many learned men, and during his reign several works on religion were published. In the reign of Pruturdhunu a number of poems were published. Dooshmuntu, Harishchandra, Pruturdhunu, Rujee, Chutoorungu. Dhunwuntree, Kutee,

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Voibhandukee, Kulangu, and other kings, in his age, are also mentioned as patrons of learning.

In the Dwapuru Yoogu through learned men, king, Shoomuku, published several works on the arts, and on rhetoric. Shikbidwuju, Pooroomedhu and Bungu, are also to be placed among the monarchs of the same age, who patronized learning. Sookurmu encouraged, the celebrated poet Bharuvee to write a poem known by his own name, and still very popular among the Hindus. At the close of this Yoogu, Yoodhisthiru, and his brothers Shahdevu and Nukulu, are mentioned with high commendations for their encouragement of learning. The author is informed, that there is now in the library of Raja Rajkrishna, at Calcutta, a work by Nukoolu on horsemanship, which contains rough drawings of horses, accompanied by descriptions.

In the Kulee Yoogu, Vikrumadityu stands highest amongst the Hindu kings as the patron of learning. Nine persons under his patronage are particularly mentioned as having separately or unitedly composed a number of learned works, viz:—Dhunwuntree, Kshupunuku, Umuru Singhu, Shunkoobetalu, Chuttu, Chuttu, Ghuttu,—Kurpura, Kaleedasa, Mehiru, Vurahu and Bururoochee. The first of these nine wrote a work called Nirghuntu, also another on medicine and another on incantations. Kshupunuku wrote on the primary elements, Umurusinghu compiled a Dictionary of the Sangskritu a work on the Meemangsuku philosophy, etc. Shunkubetalu—Bhuttu wrote a work on the Ulunkaras, and a comment on the Voisheskiku Philosophy. Ghutukurpura wrote a poecal work of no great merit. Kalee Dasa wrote the following works:—Sunkhyututwu Koumoodee, Koomaru Sumbhuvu, Rughu and Ubhignanu Shukcontula, also a poem on the seasons, a work on astronomy, a poetical history of the Gods, etc. Vurahu wrote two works on astrology, and one on Arithmetic. Bururoochee wrote a Sanskrita grammar or rather improved the Kulapu, by Survvuvarma: he also wrote a comment on the Tuntrus, and a poem in praise of king Madhuvu. These learned men are said to have written works in the eighteen original languages from which, the Hindus say, all the languages of the Earth have been derived. At the period when Vikrimadityu lived, Maghu, another king, caused to be written a poem which he called by his own name, and for each verse of which he is said to have paid to different learned men a gold mohur, which amounts to 52,800 rupees for the whole work. About the same period, Kurnatu, a king, was famed for patronizing the same

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learned men who attained such fame at the Court of Vikramaditya. A short time before this, Bukmunu a king, entertained at his Court a number of learned men, and amongst them Madhuvacharyu, who wrote the Udhikuranamala, a work on the Meemangsuku philosophy. Dhavuku, a poet of the same age, received from king Shreehurshu, 100,000 rupees for a poem called Ratnamala. At the Court of Runu Singha, Raja of Kashmere, several learned men acquired great fame; among the rest Vayubhutu, Mumutu and Koiyutu. The first wrote remarks on the Sanskrita language; Mammata wrote the Kavyuprukashu, and Koiyutu a large comment on Paninee's Grammar, King Bhoja, who assembled many learned men at his court is mentioned as being himself the author of Bhoja Chashya a work on the Patanjali philosophy. To Soonduru the son of Goonusindhoo, the king of Kanchee Pooru, several poems are ascribed, at the courts of Prutya Padityu and Adishooru, a number of learned men were entertained.

The Game of Chess.

If evidence be required to prove that Chess was invented by the Hindus, we may be satisfied with the testimony of the Persians; who, though as much inclined as other nations to appropriate the ingenious inventions of a foreign people, unanimously agree, that the game was imported from the west of India, together with the charming fables of Vishnusarman in the sixth century of our era: it seems to have been immemoriably known in Hindustan by the name of Chaturanga, that is the four anga's, or members, of an army, which are said in the Amarkosha to be *hastyas warat at hapadatam*, or elephants, horses, chariots, and foot-soldiers; and in this sense, the word is frequently used by epic poets in their description of real armies. By a natural corruption of the pure Sanscrit word, it was changed by the old Persians into Chatrang but the Arabs, who soon after took possession of their country, had neither the initial nor final letter of that word in their alphabet and consequently altered it further into Shatranj, which found its way presently into the modern Persian, and at length into the dialects of India, where the true derivation of the name is known only to the learned: thus has a very significant word in the sacred language of the Brahmans been transformed by successive changes into *axedrez*, *scachi*, *echecs*, *chess*, and, by a whimsical concurrence of circumstances, given birth to the English word check and even a name to the Exchequer of Great Britian. The

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beautiful simplicity and extreme perfection of the game, as it is commonly played in Europe and Asia, convince me that it was invented by one effort of some great genius; not completed by gradual improvements but formed to use the phrase of Italian critics, *by the first intention;* yet of this simple game, so exquisitely contrived, and so certainly invented in India, I cannot find any account in the classical writings of the Brahmans. It is, indeed, confidently asserted, that Sanscrit books on Chess exist in this country and if they can be procured at Benaras, they will assuredly be sent to us: at present I can only exhibit a description of a very ancient Indian game of the same kind; but more complex, and in my opinion, more modern than the simple chess of the Persians. This game is also called Chaturanga but more frequently Chaturaji or the four Kings, since it is played by four persons representing as many princes, two allied armies combating on each side; the description is taken from the Bhawishya Puran, in which Yudhisthir is represented conversing with Vyasa, who explains at the King's request the form of the fictitious warfare and the principal rules of it: "having marked *eight* squares on all sides, says the sage, place the "red army to the east', the *green* to the south, the *yellow* to the "west, and the *black* to the north, let the *elephant* stand on the left "of the *king*; next to him, the *horse*, then, the *boat*; and before them all, four *foot soldiers*; but the *boat* must be placed in the *angle* of the "board," From this passage it clearly appears that an army, with its four anga's, must be placed on each side o the board, since an *elephant* could not stand, in any other position on the left hand of each *king*; and Radhacant informed me, that the board consisted, like ours, of *sixty-four* squares, half of them occupied by the forces, and, half vacant: he added, that this game is mentioned in the oldest law-books, and that it was invented by the wife of Ravan, King of Lanca, in order to amuse him with an image of war, while his metropolis was closely besieged by Rama in the second age of the world. He had not heard the story told by Fridausi near the close of the Shahnamah, and it was probably carried into Persia from *Canyakuvja*, by Borzu, the *favourite physician*, thence called *Vaidyapriya*, of the great Aunshiravan; but he said that, the ahmans of Gour, or Bengal, were once celebrated for superior skill in the game, and that his father, together with his spirtual preceptor Jagannath, now living at Tribeni, had instructed two young Brahmans in all th rules of it,

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and had sent them to Jayanagor at the request of the late Raja who had liberally rewarded them. A *ship*, or *boat*, substituted, we see, in this complex game for the *rath* or armed *chariot*, which the Bengalese pronounce Rot'h, and which the Persians changed into *Rokh*, whence came the *rook* of some European nations; as the *vierge* and *fol* of the French are supposed to be corruptions of *fern* and *fil*, the *prime minister* and *Elephant* of the Persians and Arabs: it were vain to seek an etymology of the *word rook* in the modern *Persian* language; for, in all the passages extracted from Firdausi and Jami where *rokh* is conceived to mean a hero, or a fabulous bird, it signifies, I believe, no more than a *cheek* or a *face*; as in the following description of a procession in *Egypt*: "When a thousand youths like cypresses, box trees and firs, with locks as fragrant, cheeks as fair, and bosoms as delicate, as lilies of the valley, were marching gracefully along, thou wouldst have said, that the new spring was *turning his face* (not, as Hyde translates the words, *carried on Rokh*) from station to station;" and as to the battle of the *duwazdeh rokh*, which Dherbelot supposes to mean *douze preux chevaliers*, I am strongly inclined to think, that the phrase only signifies a combat of twelve persons face to face, or six on a side. I cannot agree with my friend Radhacant, that a *ship* is properly introduced, in this imaginary warfare instead of *chariot*, in which the old Indian warriors constantly fought for, though the king might be supposed to sit in a car, so that the four Anga's would be complete, and though it may often be necessary in a real campaign to pass rivers or lakes, yet no river is marked on the Indian, as it is on the Chinese Chess Board, and the intermixture of ships with horses, elephants, and infantry embattled on a plain, is an absurdity not to be defended. The use of *dice* may, perhaps, be justified in a repersentation of war, in which fortune has unquestionably a great share, but it seems to exclude chess from the rank, which has been assigned to it, among the sciences, and to give the game before us the appearance of *whist*, except that pieces are used openly, instead of cards which are held concealed: nevertheless we find, that the moves in the game described by Vyasa were to a certain degree regulated by *chance*; for which he proceeds to tell his royal pupil, that, "if *cinque* be thrown, the king or a pawn must be moved; if quarter, the elephant; if *trois*, the *horse*; and if *deux*, the *boat*."

He then proceeds to the moves: *the king* passes freely on all

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sides but over *one* square only; and with the same limitation, the *pawn* moves, but he advances straight forward, and kills his enemy through an angle; the *elephant* marches in all directions, as far as his driver pleases; the *horse* runs obliquely, traversing three squares; and the ship goes over two squares diagonally." The *elephant* we find, has the powers of our *queen*, as we are pleased to call the *minister*, or *general*, of the Persians and the *ship* has the motion of the piece to which we give the unaccountable appellation of bishop, but with a restriction which must greatly lessen his value.

(JONES.)

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EDITORIAL REFLECTIONS.

THE HON'BLE MR. SINHA'S ADVICE TO INDIAN STUDENTS

Mr. Sachchidananda Sinha, the talented editer of the *Hindustan Review*, delivered an inspiring address as president of the fifth Beharee Students' Conference held at Arrah on the 8th October 1910. The address is full of sage advice, sound exhortation, and profound observations. Referring to the Renassiance in India, the learned president quoted the pregnant words of Bishop Welledon admirably sketching the movement.

> "One feature is apparent in educated India—there is life where there was stagnation. The spiritual nature of Indian thinkers and writers is absorbed in the prospect of an awakening East, an Indian nation, a free and enlightened people, a deliverance from the nightmare of superstition and the tyranny of caste."

The speaker rightly characterised the anarchical outrages which have disgraced the fair name of India as a passing phase of the great Renaissance which we witness on all sides, and which is "changing with an almost kaleidoscopic rapidity the perspective outlook and standpoint of educated Indians." Surely these undesirable manifestations which are opposed to the genius of our race, the sacred traditions of this hoay land of sages, and the spirit of our ancient civilization whose distinctive contribution to the culture of the world is the doctrine of *ahinsa*—love for all sentient beings—preached from the heights of the towering Himalayas by Patanjali, the prince of *yogees*, and Budha the Lord of Mercy—a teaching which finds a distinct echo in the sermons of Christ through the instrumentality of whose church it has considerably influenced the progressive career of the juvenile Occident. Mr. Sinha advised his hearers to keep vividly before their minds lofty ideals while guarding against "airy aspirations." It is a pity that the conduct of a few misguided stumporaters has rendered it necessary for publicists in India to preach the subjection of ideals to limitations. An ideal has an outlet into infinity and loses its ethereal and heavenly character as soon as it is subjected to a limitation. The mischief arose in India not

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because the lofty ideal of independence was cherished by pure souls, but because interested people dethroned it from its majestic pedestal installed in the sphere of entrancing and enrapturing visions and made it of the earth earthy by endeavouring to dovetail it into practical politics which is and ought always to be a game of compromise. Politics can rightly be identified with opportunism. When an ideal was skewered on to a programme smacking of expediency—of course legitimate expediency sanctified by moral sanctions leavened with practical wisdom—it revenged itself upon those responsible for the sacrilege and drove them out of the field Of course, the swift chastisement was attended with violence which caused suffering to the innocent along with the guilty. But this was inevitable. Whoever disturbs the crater of a volcano endangers not only his own life and safety but also the life and safety of his neighbours. Let us then instead of seeking to limit ideals guard them from sacrilege. We believe this was also the intention of Mr. Sinha. He did not mean that it was a wrong thing to be a visionary in moments of spiritual exaltation. The mischief arises when the visions of the visionary are ruthlessly dragged from their proper element breathing of sweet heavenly fragrance and made to fit in with a sphere of existence to which they are ill suited. Let the visionary see visions by all means. But when a visionary who ought to represent the element of trascendental contemplation and abstract speculation loses his footing and falls into the valley of practical politics and preaches his message to the uninitiated, he unconsciously conveys an electric spark to a heap of straw and works ruin and desolation. By the uninitiated we mean persons deficient in historical training who are not expected to understand that however commendable the ideal of absolute independence may be in the abstract, it is a crime not to realize that at the present stage of India's mental and moral development, British rule is not only essential but is a blessing—a providential arrangement the withdrawal of which for many centuries to come is sure to lead to the recrudescence of the elements of disorder and anarchy. The ideal of the philosopher need not be limited, but when a demagogue stands upon the political platform and preaches to raw, excitable and impatient youths that *political agitation should be directed to the attainment of absolute swaraja, he plays with fire* and raises a Frankstein which he and the like of him are powerless to lay. We think every Government has a right to protect society from such *yogubhrasht* Sanyasis

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who work mischief by inspiring expectations which they know or ought to know cannot be realized at present and can but sour and embitter tempers and convert healthy discontent into morbid repining and peevish murmuring which develop into murderous designs and diabolic mental activity and materialise into bombs. Mr. Sinha rightly laid special stress on the inherent defects in the Indian character which render the Indian unfit for self Government and unworthy of the citizenship of an autonomous state and must be eradicated before any considerable advance can be made in the direction of Swraja within the Empire. Said he:—

"To evolve in your country a true and genuine nationality, it is not only necessary that you should realise the right lines on which to proceed, but also the requisite qualifications which you as citizens should possess, You know the popular saying that every people has the government it deserves, which means that the type of each Government depends upon the character and capacity of the people it rules over. That is a truism, and hence if you want to enjoy the benefits of self government under British rule, it is your bounden duty to equip yourself with such capacity and character as will enable you to exercise, with credit to yourself and with advantage to your people, the high privileges which citizenship in a self-governing state brings in its train. Immense as has been the progress in the intellectual and moral advancement of educated Indians, not even our greatest admirer can honestly say that we are not wanting in the possession of many of those public virtues which are necessary equipments of the character of a citizen. Leaving aside the masses, that is the vast bulk of our people, it cannot be honestly said that even the educated classes have yet displayed in any appreciable degree the possession of that kind of character which one has to pre-suppose as existing in citizens of self-governing states. Our deep-rooted selfishness, our ingrained spirit of disunion, our blind confidence in the existing state of thing, and our reluctance to accept the efficacy of change, our helplessness in the face of natural evils and sudden difficulties, our short-sighted coveteousness that impels us often to kill the goose that lays the golden egg, our habits of sheer indolence and procrastination, our loose, careless talk and reckless promises and assertions, our distrust of each other and the absence of any feelings of co-operation in us—these and many other failings of a like nature—all conduce to make earnest work difficult, slow, exasperating and as often as not abortive. They have a saying in the West that 'all are for each and each is for all', whereas with us it is a case, I fear,, of 'each for himself and only God for us all." If, therefore, you desire to develop the character which will enable you to discharge properly your duties and responsibilities in the State, you have a treble duty to perform—firstly, to conquer the many shortcomings of your character, to extirpate from your mind the pernicious effects of early teachings and surroun-d ings, secondly, to teach and help your co-adjutors in public work to do the same; and thirdly, to organise the work itself".

We endorse every word of these profound observations. Our public men talk too much of rights and the obligations are left severely alone. It is conveniently forgotten that "the character of

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the nation determines the form of the state" and that "social equality is a postulate of pure democracy ".

We cry for pure democracy but the wails of the down-trodden and the oppressed—the untouchables—crying out for speedy vengeance and prompt retribution belie our claims to fitness for that position. Says Lord Acton.

"The most certain test by which we judge whether a country is really free is the amount of security enjoyed by minorities."

Who can contemplate without horror and trembling the fate of the *antayya* minority if the British withdrew tomorrow and the ascendancy of high castes was re-established? We do not doubt that some politicians possessed of brains stuffed with ill-digested shibboleths would hasten to establish a republican *form* of government. But what is there in a form? We are repeating the old mistake of taking the husk to be the kernel, the form to be the spirit, the lifeless corpse to be the living organism. Says the same philosopher—historian:—

No obstacle has been so constant, so difficult to overcome, as uncertainty and confusion touching the nature of true liberty. If hostile interests have wrought much injury, false ideas have wrought still more, and its advance is recorded in the increase of knowledge, as much as in the improvement of laws. *The history of institutions is often a history of deception and illusions: for their virtue depends on the ideas that produce and on the spirit that preserves them and the form may remain unaltered when the substance has passed away.*

The speech is excellent and is well worth a perusal.

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The Gurukula Samachar.

Motto I:—By the force of *Brahmacharya* alone have sages conquered death.—*The Veda.*

Motto II:—The welfare of society and the justice of its arrangements are, at bottom, dependent on the characters of its members..... .....There is no political alchemy by which you can get golden conduct out of leaden instincts.—*Herbert Spencer.*

The Rishi Utsav.

The Dewali day being the day on which Bhagwan Dyananda's beatified spirit ascended to abodes of perpetual bliss was celebrated in the Gurukula in a befitting manner. One day before the Dewali proper, the Sahitya Parisad held an extraordinary meeting at which papers in Sanskirt and Arya Bhasha were read dwelling on the different aspects of the manifold activity of the great departed. Professor Rama Deva read a paper in Arya Bhasha on "Dyananda's Message to Students of Comparative Religion." On the Dewali day, a meeting was held in the evening at which beautiful Sanskrit songs composed by Brahmcharies Harishandra and Brahmdatta and charming Arya Bhasha songs composed by Pandit Saligram Shastri and Brahmchari Devadatta were sung and short but impressive speeches were delivered by Brahmchari Harishandra, Professor M. C. Sinha M. Sc, M. Ghansham Singh Gupta B. Sc. L. L. B. Pleader—who is, as it were, an unattached fellow of the college—and Principal Munshiram who presided. After the meeting was over, all the professors, teachers, supdts and Brahmcharies sat down to a sumptuous feast. The buildings were illuminated and the entire block wore a gala day appearance. Thus was celebrated the day sacred to the memory of Bhagwan Dyananda in the institution which is a concrete realization of the lofty ideals of the only *Aditya Brahmachr* of his age.

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The Executive and Teaching Staff.

Experience having demonstrated that the executive work of the Gurukula is too heavy for one man, Mahatma Munshi Ram has appointed Professor Rama Deva Deputy Governor and Professor Balkrishna Vice-Principle. L. Nand Lal has already been working as Assistant Governor. We hope that this devolution of work and delegation of powers will relieve Mahatma Munshi Ram from much drudgery and enable him to devote his time and energies to the training of the character of the Brahmcharies—a work for which he alone is fitted on account of his age, his profound learning, his lofty character and his vast and varied experience. Mahashya Govardhan having resigned the Headmastership in order to be able to devote himself exclusively to teaching and literary work, L. Luchhman Das B. A. has been appointed in his place. While we cannot but regret the step taken by Mr. Govardhan who has done so much to organise the Vidyalya and to place it on a secure footing and has earned the thanks of the authorities for the conscientious manner in which he has always discharged the onerous duties of his office, it is a source a gratification to all of us that his successor is also an experienced and level-headed teacher who, we have every reason to believe, will worthily maintain the traditions of his new post. He has been in the teaching line for over a decade and has creditably filled the post of headmaster in an important Indian state for a number of years. We wish him all success in his noble work.

Two Forthcoming Publications.

The last forms of **Professor Rama Deva's Arya Bhasha History of Ancient India Volume I.** are in press and it is almost certain that the book will be ready for sale on the occasion of the next anniversary of the Lahore Arya Samaj. It comprises 704 pages and deals with the literature, polity, social institutions, intellectual achievements, and military glories of the ancient Aryas, presents a connected story of the origin, development, perfection, and incipient decay of ancient Arya civilization, discusses the mental, moral and political causes of India's rise and decline as a world-power, refutes by arguments based or quotations from original *arash* works the theories of Europeans savants about the ancient Aryas being beef-eaters, attempts to describe the different forms of Government that prevailed in ancient times in India, endeavours to solve the

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thorny question of Indian chronology, and treats in detail of the codes of Criminal, Civil, Ecclesiastical and Customary law in Aryavarta of old, and gives a word-painting of ancient educational institutions, and of systems of juvenile training then in vogue. The work will contain three beautiful illustrations, one giving a glimpse of a session of the Imperial Parliament of the Federated States of Ancient India presided over by Emperor Dasruth, and the other two exhibiting pathetic scenes from ancient Aryan life. The price of the book is Re. one and annas four only. Intending purchasers will do well to apply to Pandit Anant Ram Sharma Manager Sat Dharam Pracharak Press at once, for applications are pouring in and it is expected that the first edition will be soon exhausted.

"**The Arya Samaj and its Detractors**" is the name of the English work which also will be published in the course of the next fortnight. It is a work much in request. A prospectus was issued by **Mahatma Munshi Rama** so for back as March 1910. It contains a brief history of the Arya Samaj, an exposition of its mission in the world, a statement of the causes that have led to its present troubles, a refutation of the charges of sedition &c. brought forward against it every now and then, a complete history of the Patiala case, the secret history of the withdrawal of that historic trial not a single thrilling and sensational incident of which has yet seen the light of the day, and gives a *resume* of the political philosophy of Dayananda. The price is 5 Rs. Will be sold by Pandit Anant Ram Manager Sat Dharam Pracharak Press Gurukula Kangri.

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